



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/597,996	08/15/2006	Radu Catalin Surdeanu	NL04 0166 US1	8935

65913 7590 03/29/2012
Intellectual Property and Licensing
NXP B.V.
411 East Plumeria Drive, MS41
SAN JOSE, CA 95134

EXAMINER

TRAN, TRANG Q

ART UNIT	PAPER NUMBER
----------	--------------

2811

NOTIFICATION DATE	DELIVERY MODE
-------------------	---------------

03/29/2012

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ip.department.us@nxp.com

Office Action Summary	Application No. 10/597,996	Applicant(s) SURDEANU ET AL.	
	Examiner TRANG TRAN	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 September 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 August 2006 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date. _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

In view of the Appeal Brief filed on 08/24/2009 PROSECUTION IS HEREBY REOPENED. A new ground of rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

/LYNNE GURLEY/

Supervisory Patent Examiner, Art Unit 2811

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, and 5-10, 12, 14-16, 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over En et al. (US 6,441,433) in view of Akamatsu et al. (US 6,492,665) and Pellerin (WO 02/075781, as disclosed in the IDS)

Re. claim 1, En discloses in Fig. 1 and related text a semiconductor device comprising a silicon-containing semiconductor body 16 with a surface, which semiconductor body is provided, near the surface thereof, with a transistor comprising: a gate 36 situated at the surface and having a side wall spacer 58 on either side of the gate (see Fig. 1), and further comprising, on either side of the gate 36, a diffusion region 24/28/50 formed in the semiconductor body, at least one diffusion region 24/28/50 being provided at the surface of the semiconductor body with a silicide region 46/48/54, characterized in that the silicide region 46/48/54 extends along the surface of the semiconductor body and continues under the side wall spacer 46/48/54.

wherein the side wall spacer 58 has a shaped (see Fig. 1) and comprises a first portion (right portion), which borders on the gate and extends substantially perpendicularly with respect to the surface of the semiconductor body, and a second portion (left portion) which extends along the surface of the semiconductor body (see Fig. 1), wherein the silicide region 46/48/54 is completely below the side wall spacer 58, wherein the side wall spacer 58 is configured to directly contact the entire surface of a side of the gate 36, and wherein the side wall spacer 58 is made of one material (silicon dioxide or silicon nitride, see Col. 5 lines 31-35).

En does not explicitly disclose a silicide region continues for more than 10 nm under the side wall spacer and a side wall spacer is L-shaped.

Akamatsu et al. teach in Fig. 4(d) and the related text a side wall spacer 15 is L-shaped.

Pellerin et al. teaches in Fig. 2D and the related text a silicide region continues for more than 10 nm (53, 20 nm to 100 nm) under the side wall spacer.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide the silicide region continues for more than 10 nm under the side wall spacer, as taught by Pellerin et al. and the L-shape side wall, as taught by Akamatsu et al. in En et al.'s device, in order to reduce resistance and to protect the gate.

Futhermore, it has been held that discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); *In re Huang*, 100 F.3d 135, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996).

Furthermore, the shape of the side wall spacer was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the side wall spacer was significant. See *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Re. claim 2, En et al. disclose the silicide region (46/48/54) contains a metal (see col. 3 lines 56-66) which, in the silicide region formed, has a higher diffusion rate than

Art Unit: 2811

silicon (En teaches the silicide region has the same material as claimed invention; therefore it has higher diffusion rate than silicon, see claim 3 below for claimed material).

Re. claim 3, En et al. the metal is selected from the group comprising nickel (Ni) (see col. 3 lines 56-66).

Re. claims 5 and 19, En and Krivokapic disclose teaches semiconductor device as claimed in claim 1, however En and Krivokapic may not explicitly teach a second portion of the L-shaped side wall spacer has a thickness, measured in a direction perpendicular to the surface of the semiconductor body, of 5 to 20 nm (maximally 40 nm).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the second portion of the L-shaped side wall spacer has a thickness, measured in a direction perpendicular to the surface of the semiconductor body, of maximally 40 nm, in order to optimize the performance of the device.

Futhermore, it has been held that discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); *In re Huang*, 100 F.3d 135, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996).

Re. claim 6, En et al. disclose an insulating layer (14) extends in the semiconductor body (13) in a direction parallel to the surface of the semiconductor body 13 (as seen in fig. 1).

Re. claims 7-8, En et al. disclose substantially the entire claimed invention, as applied in claim 1, except semiconductor body comprises a germanium component or strained-silicon layer.

Fig. 1 and Col 2, lines 14-15 of Krivokapic the semiconductor body comprises a germanium component or strained-silicon layer (as seen in Col 2, lines 14-15).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the semiconductor body comprises a germanium component or strained-silicon layer of Krivokapic in En et al.'s device, in order to improve the performance of the device.

Re. claim 9, En et al. disclose the at least one diffusion region 24/28/50 comprises the silicide region 46/48/54 (see Figs. 2A-2D).

Re. claim 10, En et al. disclose the at least one diffusion region 24/50/28 comprises a diffusion region extension extension implant region 50/28, the silicide region (46/48/54) comprising a silicide region extension 48/54, the silicide region extension falling completely within the diffusion region extension 50/28.

Re. claims 11, En et al. disclose the silicide region 46/48/54 is completely below the side wall spacer 58.

Re. claim 12, En et al. disclose substantially the entire claimed invention, as applied in claim 2, except the silicide layer comprising metal which is palladium.

Yang discloses in Fig. 2 and ¶28 a silicide layer (260) comprising metal which is palladium (Pd).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the silicide layer having claimed material, as taught by Yang in En et al.'s device, in order for suitable material use.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide claimed material for silicide layer, since it have been held to be within the general skill of a worker in the art to select a know material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416

Re. claim 14, En et al. disclose the side wall spacer (58) is configured to contact the entire surface of a side of the gate (36) without an intervening structure (see Fig. 1).

Re. claim 15, En et al. disclose an insulation layer (32) that is located below the gate (36), wherein the side wall spacer (58) is configured to directly contact the insulation layer (32).

Re. claims 16 and 18, En et al. disclose an insulation layer (32) that is located below the gate (36), wherein the gate (36) comprises a conductive layer that is made of polycrystalline silicon (Col. 5, lines 5-8) and a silicide layer (56), and wherein the side wall spacer (58) is configured to directly contact the insulation layer (32), the conductive layer and the silicide layer (as seen in Fig. 1).

Re. claim 20, En et al. disclose the silicide region (58) contains a metal (see col. 3 lines 56-66) which, in the silicide region formed, has a higher diffusion rate than silicon (En teaches the silicide region has the same material as claimed invention; therefore it has higher diffusion rate than silicon, see claim 3 above for claimed material).

En et al. and Akamatsu et al. do not disclose wherein the second portion of the L-shaped side wall spacer has a thickness, measured in a direction perpendicular to the surface of the semiconductor body, of maximally 40 nm.

It would have been obvious to one having ordinary skill in the art at the time of the invention was made to include wherein the second portion of the L-shaped side wall spacer has a thickness, measured in a direction perpendicular to the surface of the semiconductor body, of maximally 40 nm in the combined device, in order to optimize the performance of the device.

Furthermore, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Re. claim 21, En et al. disclose the silicide region (58) contains a metal (see col. 3 lines 56-66) which, in the silicide region formed, has a higher diffusion rate than silicon (En teaches the silicide region has the same material as claimed invention; therefore it has higher diffusion rate than silicon, see claim 3 above for claimed material), and wherein an insulating layer (14) extends in the semiconductor body in a direction parallel to the surface of the semiconductor body (13, as seen in Fig. 1).

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over En in view of Krivokapic as applied to claims above, and further in view of Pellerin et al. (WO 02/075781A2 as disclosed in the IDS).

Re. claim 17, En et al. disclose an insulation layer (32) that is located below the gate (36), wherein the gate comprises conductive layer, and wherein the side wall spacer (58) is configured to directly contact the insulation layer and the metal conductive layer (as seen in Fig. 1).

En discloses a gate (46) comprises a metal conductive layer (pg. 4, line 14).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the gate comprises a metal conductive layer of Pellerin in En, in order for suitable material use.

Conclusion

Art Unit: 2811

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TRANG Q. TRAN whose telephone number is (571)270-3259. The examiner can normally be reached on Mon - Thu (9am-5pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne A. Gurley can be reached on 571-272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/LYNNE GURLEY/
Supervisory Patent Examiner, Art Unit 2811

/T. Q. T./
Examiner, Art Unit 2811